Table E-2 - Urban Fast Rayleigh Multipath Profile			
Ray	**Delay (microseconds)**	**Doppler (Hz)**	**Attenuation (dB)**
1	0.0	5.2314	2.0
2	0.2	5.2314	0.0
3	0.5	5.2314	3.0
4	0.9	5.2314	4.0
5	1.2	5.2314	2.0
6	1.4	5.2314	0.0
7	2.0	5.2314	3.0
8	2.4	5.2314	5.0
9	3.0	5.2314	10.0

Table E-3 - Rural Fast Rayleigh Multipath Profile			
Ray	**Delay (microseconds)**	**Doppler (Hz)**	**Attenuation (dB)**
1	0.0	13.0785	4.0
2	0.3	13.0785	8.0
3	0.5	13.0785	0.0
4	0.9	13.0785	5.0
5	1.2	13.0785	16.0
6	1.9	13.0785	18.0
7	2.1	13.0785	14.0
8	2.5	13.0785	20.0
9	3.0	13.0785	25.0

Table E-4 - Terrain-Obstructed Fast Rayleigh Multipath Profile			
Ray	**Delay (microseconds)**	**Doppler (Hz)**	**Attenuation (dB)**
1	0.0	5.2314	10.0
2	1.0	5.2314	4.0
3	2.5	5.2314	2.0
4	3.5	5.2314	3.0
5	5.0	5.2314	4.0
6	8.0	5.2314	5.0
7	12.0	5.2314	2.0
8	14.0	5.2314	8.0
9	16.0	5.2314	5.0

When multiple rays arrive at the receive antenna, the total power received is the instantaneous vector sum of all paths; this value is referred to as the mean received Rayleigh power. Practical receivers will take advantage of this additional energy. For example, for the urban fast fading model, the mean Rayleigh power received as a result of nine rays impinging on the receiver is around 7 dB higher than the received power in the absence of multipath. As a result, the received Cd/No must be increased by 7 dB (over that of a single path) to accurately interpret the results.[9] All block error rate curves in this appendix have therefore been shifted right by the appropriate amount to account for this effect.[10]

2.2 Results of Simulations and Analyses

USADR has used simulations and analyses to characterize the performance of the hybrid IBOC digital signal in the presence of Gaussian noise, multipath fading, and interference. The results are summarized in Table E-5. The USADR studies concluded that even in the simulations' worst case scenario, the system can receive virtual CD-quality audio beyond a station's analog protected contour. The simulations tested a number of scenarios. The Gaussian noise simulations provide a baseline, or "best case" scenario, with a 22.5 dB margin above the TOA of the digital signal at the 54 dBu protected contour. The introduction of multipath fading resulted in a margin of 9 to 20.5 dB. In the final group of simulations, adding adjacent channel interference results in a typical margin of approximately 10 dB. Even in the presence of two

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9 For the rural fast scenario, a 2.9-dB adjustment must be made, and for the terrain-obstructed fast scenario, a 5.4-dB adjustment is required.

10 USADR believes this conservative approach is the correct methodology for obtaining realistic results.

independently faded first adjacent stations which are 6 dB below the level of the desired host, the system exhibits margin.[11]

For each simulation, Table E-1 lists the interference scenario under which it was run, the Cd/No in dB-Hz, the fading profile, the level of the interference, the measured block error rate, and the margin of the digital signal at the analog 54-dBu contour (assuming 10,000 K ambient noise). The fading profile is denoted by UF (urban fast), US (urban slow), RF (rural fast), or TO (terrain-obstructed fast), and is independently applied to the desired signal and each of the interferers. The interference level is given in units of dBfm, which is defined as dB relative to the total power of the analog host FM portion of the desired hybrid signal.

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[11] By definition, these two first adjacent stations would have to be short spaced.

Table E-5: Hybrid IBOC Simulation Results									
Tests	*Input Parameters*							*Measurements*	
Interference Scenarios	Cd/No (dB-Hz)	Fading	Co-Chan (dBfm)	Lower 1st Adj (dBfm)	Upper 1st Adj (dBfm)	Lower 2nd Adj (dBfm)	Upper 2nd Adj (dBfm)	Block Error Rate	Margin (dB)
No Fading/ No Interference	58.803							0.99431	
	59.203							0.71055	
	59.403							0.39033	
	59.603							0.15701	
	59.803							0.04785	
	60.003							0.0119	
	60.203							0.00181	22.50
9-Ray Fading	59.203	UF						0.0236186	
	59.503	UF						0.0171658	
	59.803	UF						0.0114021	
	60.103	UF						0.0078938	15.50
	61.203	US						0.105563	
	62.203	US						0.0813702	
	63.203	US						0.0573962	
	63.703	US						0.0438691	
	64.203	US						0.0337366	
	66.203	US						0.0128194	
	68.203	US						0.0043286	9.0
	54.141	RF						0.0451454	
	55.141	RF						0.0089486	
	56.141	RF						0.0019978	20.50
	55.581	TO						0.0709232	
	56.581	TO						0.0154832	
	57.581	TO						0.0029968	18.50
1st Adjacent Interferer	63.203	UF		12.0				0.25585	
	68.203	UF		12.0				0.01886	
	72.203	UF		12.0				0.0008771	6.50
	60.203	UF		-6.0				0.107428	
	62.203	UF		-6.0				0.01594	
	63.203	UF		-6.0				0.005889	13.0
	60.203	UF		-18.0				0.102607	
	62.203	UF		-18.0				0.01591	
	63.203	UF		-18.0				0.00474	13.0
	60.203	UF		-24.0				0.0635076	
	62.203	UF		-24.0				0.009397	
	63.203	UF		-24.0				0.00366	13.50
	59.203	UF		-30.0				0.0623907	
	61.203	UF		-30.0				0.0088654	14.50
Dual 1st Adjacent Interferers	67.203	UF		-6.0	-6.0			0.0545	
	71.203	UF		-6.0	-6.0			0.01575	3.0
	67.203	UF		-18.0	-18.0			0.01844	
	71.203	UF		-18.0	-18.0			0.00108	7.50
	67.203	UF		-24.0	-24.0			0.01557	
	71.203	UF		-24.0	-24.0			0.000603	7.750
	61.203	UF		-30.0	-30.0			0.03892	
	65.203	UF		-30.0	-30.0			0.00302	12.50
	63.203	UF		-6.0	-30.0			0.05296	
	67.203	UF		-6.0	-30.0			0.00844	9.0

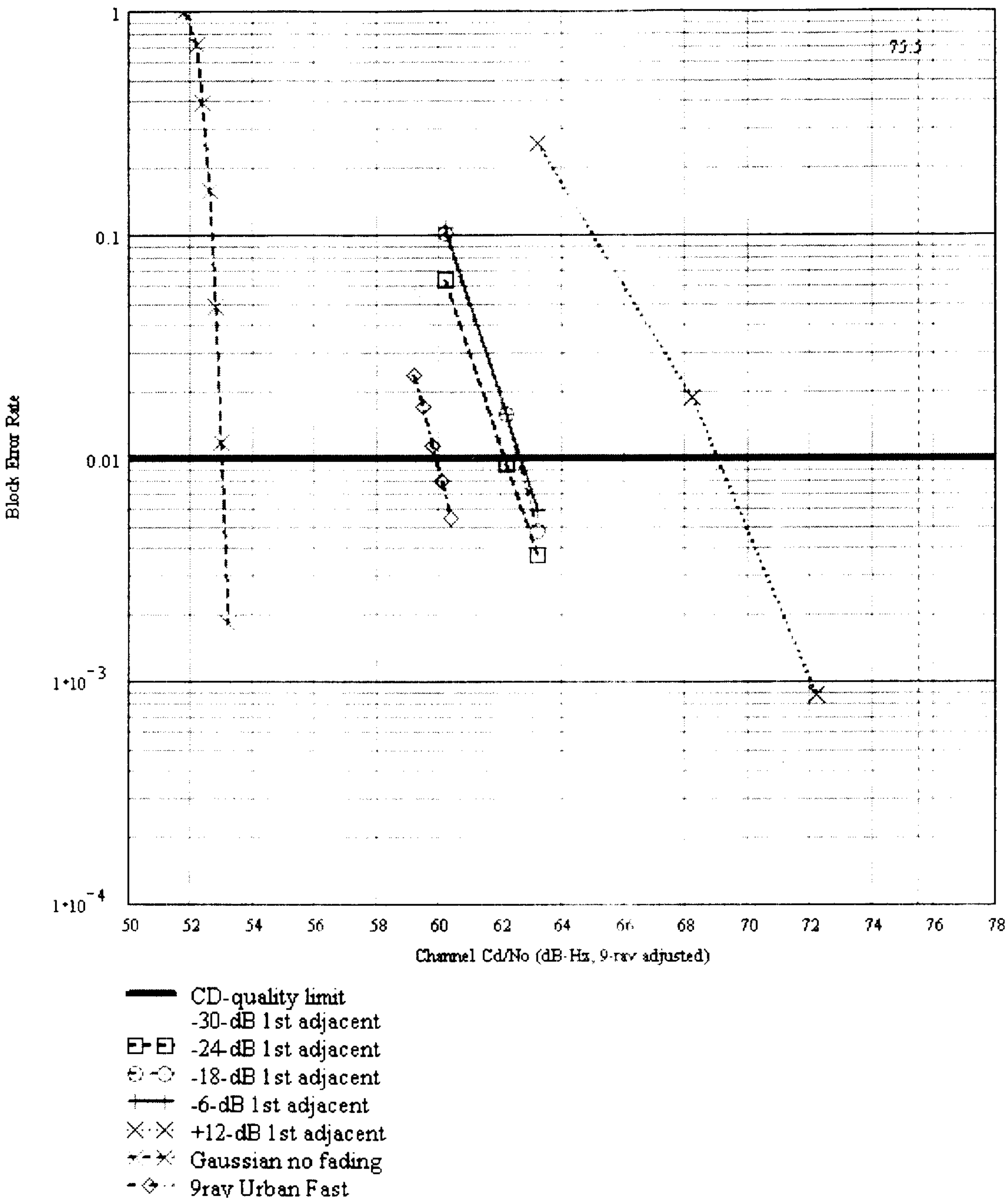
Table E-5 - Hybrid IBOC Simulation Results Continued									
Tests	***Input Parameters***							***Measurements***	
Interference Scenarios	Cd/No (dB-Hz)	Fading	Co-Chan (dBfm)	Lower 1st Adj (dBfm)	Upper 1st Adj (dBfm)	Lower 2nd Adj (dBfm)	Upper 2nd Adj (dBfm)	Block Error Rate	Margin (dB)
2nd Adjacent Interferer	60.203	UF				50.0		0.0845334	
	62.203	UF				50.0		0.0283443	
	66.203	UF				50.0		0.0052027	11.0
	60.203	UF				40.0		0.204778	
	62.203	UF				40.0		0.0027887	14.50
Dual 1st and 2nd Adjacent Interferers	71.203	UF		-6.0		40.0		0.0188546	
	75.203	UF		-6.0		40.0		0.0063681	2.0
	71.203	UF		-6.0		20.0		0.0116124	
	74.203	UF		-6.0		20.0		0.0032881	4.0
	68.203	UF		-6.0		12.0		0.0314594	
	71.203	UF		-6.0		12.0		0.0089486	5.0
	64.203	UF		-6.0		0.0		0.0215065	
	66.203	UF		-6.0		0.0		0.0098227	9.50
Co-Channel Interferer	60.203	UF	-10.0					0.0736702	
	61.203	UF	-10.0					0.0494048	
	65.203	UF	-10.0					0.0120962	
	68.203	UF	-10.0					0.0070757	9.50
	60.203	UF	-20.0					0.0191294	
	61.203	UF	-20.0					0.006493	14.50

2.2.1 Performance in Gaussian Noise

In order to calibrate the simulation[12] and provide an upper bound to system performance, simulations were performed in Gaussian noise only, in the absence of Rayleigh fading and interference. The block error rate results are shown in Figure E-1, and summarized in Table E-5. The margin between the TOA and the analog 54-dBu protected contour is about 22.5 dB assuming a 10,000 K Gaussian noise environment

12 Curves displaying performance of QPSK in Gaussian noise with FEC coding can be found at *Reference Manual for Telecommunications Engineering*, Second Ed., Roger Freeman (1991) at 1414-15.

Figure E-1 Block Error Rate Results of a Hybrid System in 9-Ray Urban Fast Fading with One Independently Faded First-Adjacent Interferer



2.2.2 Performance in Rayleigh Fading

Simulations were performed in the following selective fading environments, in the absence of interference. The block error rate results are shown in Figure E-2, and summarized in Table E-5.

2.2.2.1 Urban Slow[13] - The margin between the TOA and the analog 54-dBu protected contour is about 9 dB in an urban slow-fading channel and a 10,000 K Gaussian noise environment.[14]

2.2.2.2 Urban Fast[15] - The margin between the TOA and the analog 54-dBu protected contour is about 15.5 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment.

2.2.2.3 Rural Fast[16] - The margin between the TOA and the analog 54-dBu protected contour is about 20.5 dB in a rural fast-fading channel and a 10,000 K Gaussian noise environment.

2.2.2.4 Terrain Obstructed Fast[17] - The margin between the TOA and the analog 54-dBu protected contour is about 18.5 dB in a terrain obstructed fast-fading channel and a 10,000 K Gaussian noise environment.

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13 Refer to Table E-1 for a definition of this profile.

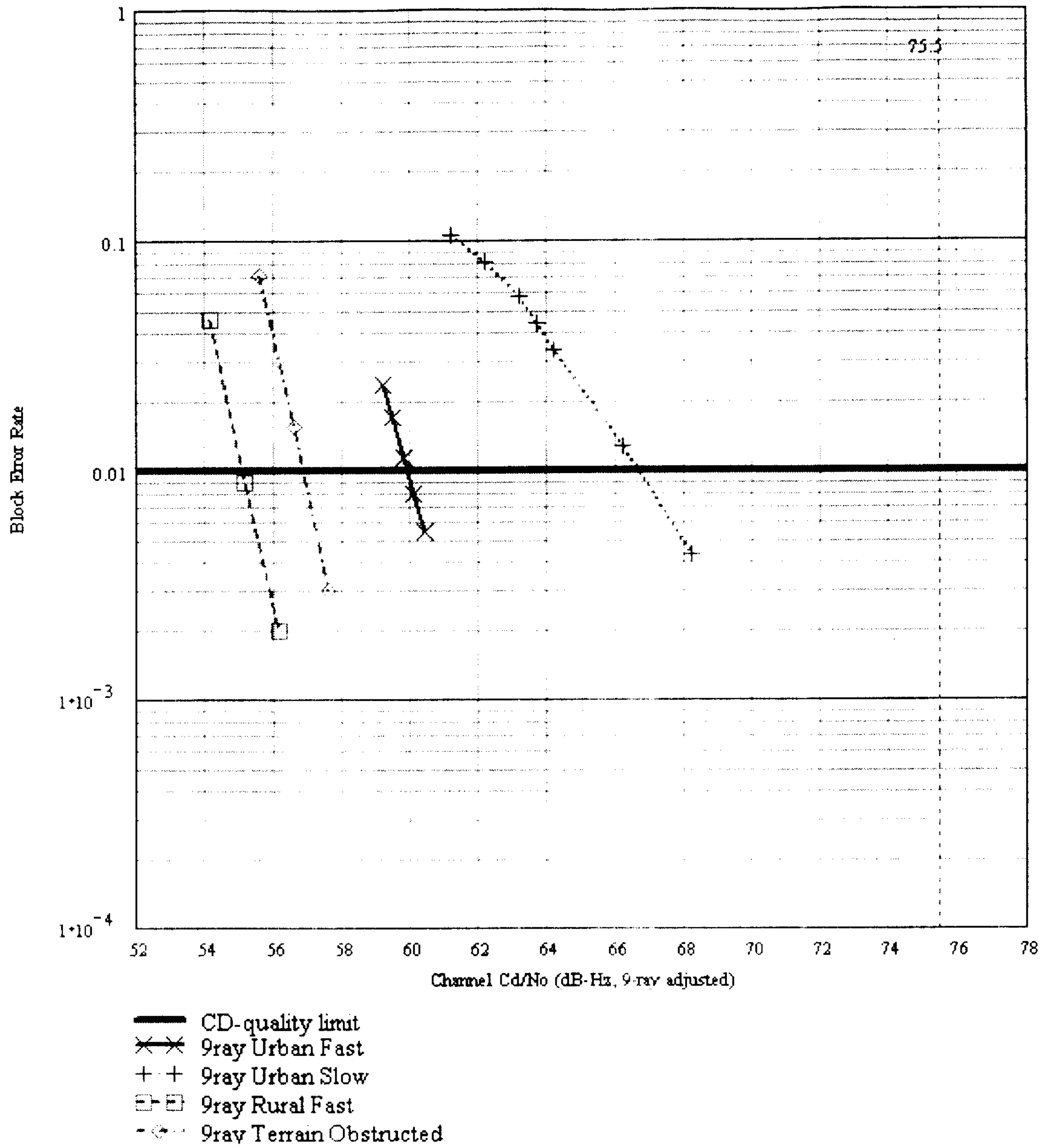
14 Note that performance in this and other slowly fading environments can be improved by increasing the size of the interleaver.

15 Refer to Table E-2 for a definition of this profile.

16 Refer to Table E-3 for a definition of this profile.

17 Refer to Table E-4 for a definition of this profile.

Figure E-2 Block Error Rate Results of the Hybrid System in Different Types of 9-Ray Fading



2.2.3 Performance in the Presence of Independently Faded Interference

This interference is comprised of various combinations of upper and lower first adjacent and second adjacent signals, as well as co-channel signals. The interferers may be analog, hybrid, or all-digital. Each interferer in a given scenario is passed through the same type of Rayleigh fading channel as the desired signal; however, all signals are independently faded, and are therefore uncorrelated.

2.2.3.1 Co-Channel Interference

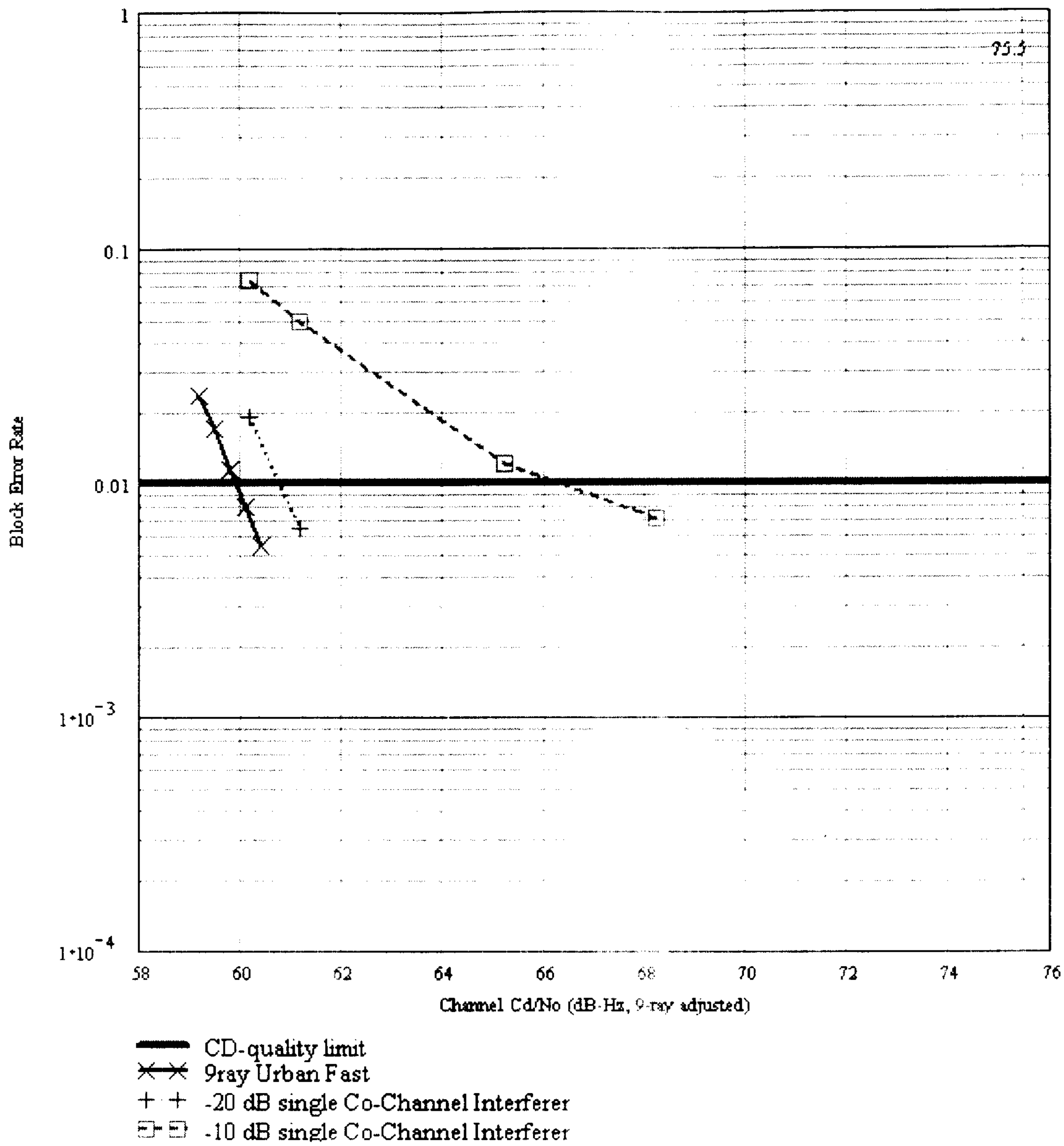
Properly spaced Class B stations are protected to the 54 dBu contour from co-channel interference exceeding 34 dBu in 50 percent of the locations for 10 percent of the time. This means that 90% of the time at the 54 dBu contour the D/U exceeds 20 dB. Based on this information, a number of observations can be made regarding the character of co-channel interference.

A co-channel interferer that is purely analog will have a negligible effect on the performance of the desired digital signal, because it will usually be at least 20 dB lower in power than the analog host at the 54-dBu analog protected contour. In addition, there is very little frequency overlap between the interferer and the desired digital sidebands.

A hybrid co-channel interferer should have a minimal effect on the performance of the desired digital signal, since it will usually be at least 20 dB lower in power than the digital sidebands at the 54-dBu analog protected contour. This has been verified via simulation. A –20-dB hybrid co-channel interferer was applied to the desired hybrid signal in an urban fast-fading environment. The block error rate results are shown in Figure E-3, and are summarized in Table E-5. Figure E-3 indicates that adding a –20-dB hybrid co-channel interferer degrades performance by less than 1 dB; margin between the TOA and the analog 54-dBu protected contour is about 14.5 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of a –20-dB co-channel hybrid interferer.

An all-digital co-channel interferer will have more effect on the performance of the digital signal. It will usually be less than 10 dB lower in power than the digital sidebands at the 54-dBu analog protected contour. The effect has been verified via simulation. A –20-dB all-digital co-channel interferer (+10-dB D/U) was applied to the desired hybrid signal in an urban fast-fading environment. The block error rate results are shown in Figure E-3, and are summarized in Table E-5. Figure E-3 indicates that adding a –20-dB all-digital co-channel interferer degrades performance by about 4.5 dB; margin between the TOA and the analog 54-dBu protected contour is about 9.5 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of a –20-dB co-channel all-digital interferer (+10-dB D/U).

Figure E-3: Block Error Rate Results of the Hybrid System in Urban Fast 9-Ray Fading with a Single Co-Channel Interferer.



2.2.3.2 Single First Adjacent Interference

Simulations have characterized the performance of hybrid IBOC digital signals in the presence of a single first adjacent analog FM signal in a Rayleigh urban fast-fading channel. Properly spaced Class B stations are protected to the 54-dBu contour from first adjacent channel interference exceeding 48 dBu in 50 percent of the locations for 10 percent of the time. As a result, simulations were performed with first adjacent analog interferers of varying power, up to a level that is 6 dB below that of the analog host.[18]

The block error rate results are shown in Figure E-1, and summarized in Table E-5. Note that the performance does not significantly degrade as the interference level increases from -24 dB to -6 dB (relative to the host analog). This phenomenon can be attributed to the First Adjacent Cancellation ("FAC") algorithm used in the receiver. Margin between the TOA and the analog 54-dBu protected contour is about 13 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of a -6-dB first adjacent analog interferer.

Figure E-1 and Table E-5 also show performance in the presence of a single +12-dB first adjacent analog interferer. Although degraded relative to a -6-dB first adjacent, margin between the TOA and the analog 54-dBu protected contour is still about 6.5 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of a +12-dB first adjacent interferer. This result is conservative, since the simulation's limited degree of FAC interference rejection did not completely cancel the adjacent channel. Practical receiver implementations could provide sufficient FAC interference rejection to effectively cancel significantly larger first adjacent interferers.

Performance in the presence of a first adjacent hybrid interferer will be similar to performance with a first adjacent analog interferer, since the digital portion of the hybrid interferer does not overlap in frequency with the desired digital signal.

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18 This 6-dB D/U should only be present less than 10% of the time in less than 50% of the stations protected contour. *See* 47 C.F.R. § 213.

Performance in the presence of a first adjacent all-digital interferer will be similar to performance in the absence of interference, since the all-digital interferer does not overlap in frequency with the desired digital signal.

2.2.3.3 Second Adjacent Interference

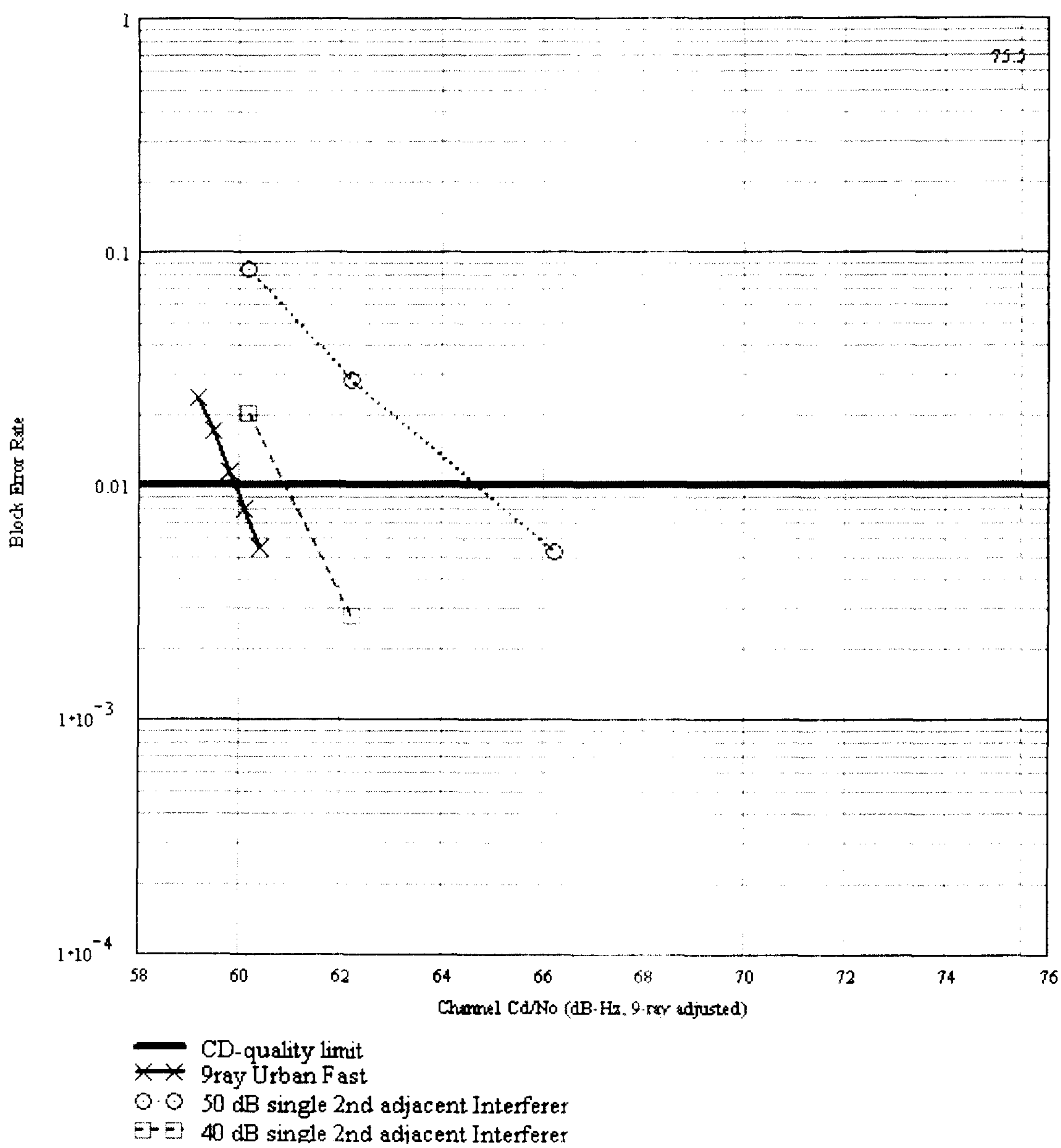
Properly spaced Class B stations are protected to the 54-dBu contour from second adjacent channel interference exceeding 94 dBu in 50 percent of the locations for 10 percent of the time. Based on this information, a number of observations can be made regarding the character of second adjacent interference.

An analog second adjacent interferer will have a negligible effect on the performance of the digital signal, since it does not overlap in frequency with the desired digital signal.

A hybrid second adjacent interferer should have a minor effect on digital performance. Since the interference power could be 40-dB higher than the desired signal, interference sidelobes could spill into the desired digital sidebands. This effect has been quantified in simulation. A +40-dB hybrid second adjacent interferer was applied to the desired hybrid signal in an urban fast-fading environment. The block error rate results are shown in Figure E-4, and are summarized in Table E-5. Figure E-4 indicates that adding a +40-dB hybrid second adjacent interferer degrades performance by about 1 dB; margin between the TOA and the analog 54-dBu protected contour is about 14.5 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of a +40-dB second adjacent hybrid interferer.

An all-digital second adjacent interferer will have a greater effect on digital performance than a hybrid second adjacent, since its sidelobes are 10 dB higher. This effect has been quantified in simulation. A +40-dB all-digital second adjacent interferer (-50 dB D/U) was applied to the desired hybrid signal in an urban fast-fading environment. The block error rate results are shown in Figure E-4, and are summarized in Table E-5. Figure E-4 indicates that adding a +40-dB all-digital second adjacent interferer degrades performance by about 4 dB; margin between the TOA and the analog 54-dBu protected contour is about 11.0 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of a +40-dB second adjacent all-digital interferer (-50-dB D/U)

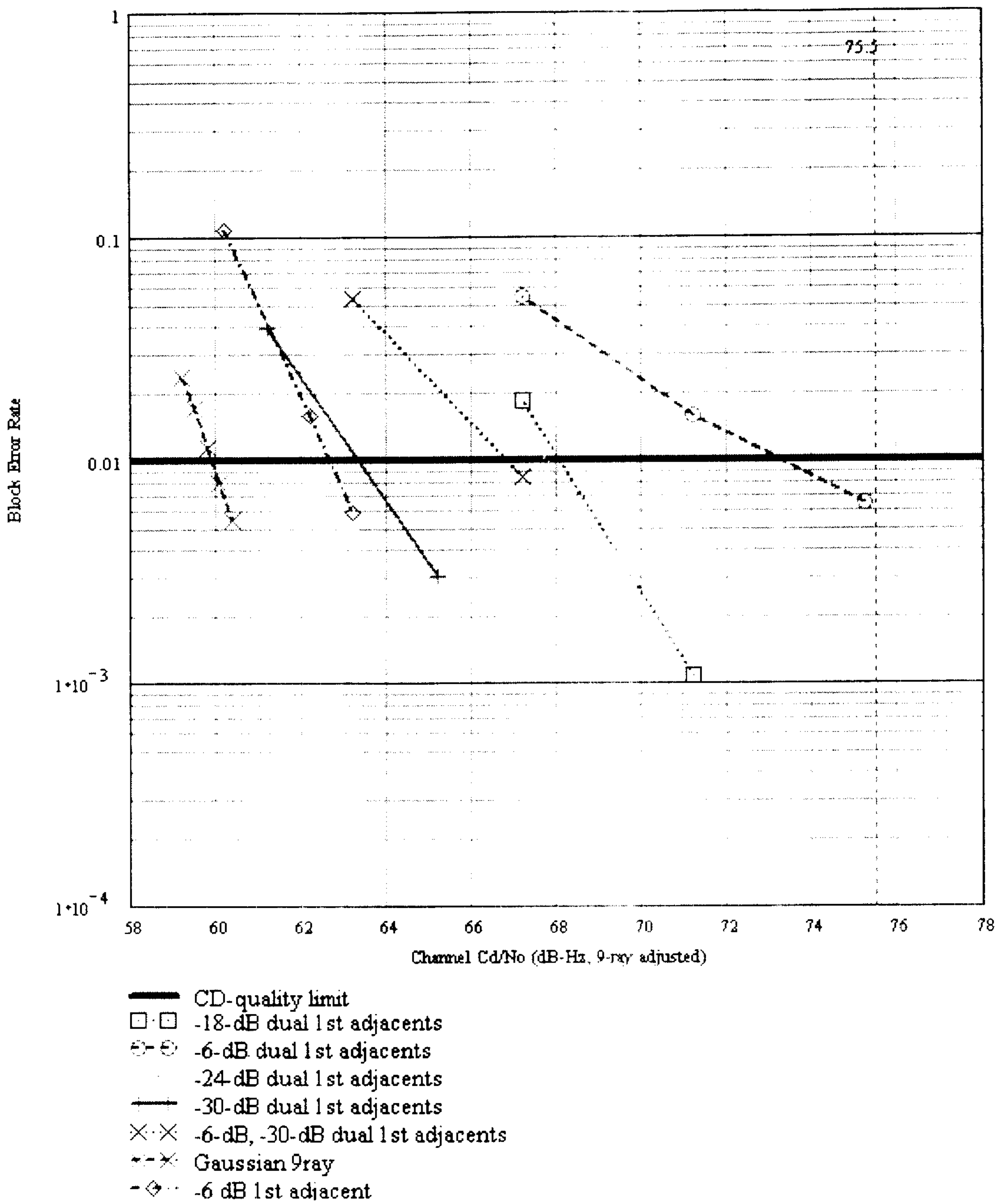
Figure E-4 Block Error Rate Results of the Hybrid System in Urban Fast 9-Ray Fading with a Single 2nd Adjacent Interferer



2.2.3.4 Simultaneous Dual First Adjacent Interference

Simulations have characterized the performance of hybrid IBOC digital signals in the presence of two first adjacent analog FM signals in a Rayleigh urban fast-fading channel. Properly spaced Class B stations are protected to the 54-dBu contour from first adjacent channel interference exceeding 48 dBu in 50 percent of the locations for 10 percent of the time. As a result, simulations were performed with two first adjacent analog interferers of varying power, up to a level that is 6 dB below that of the analog host. USADR's analysis indicates this situation would occur only when the three stations are short spaced, which is not a common occurrence. The block error rate results are shown in Figure E-5 and summarized in Table E-5.

Figure E-5 Block Error Rate Results of the Hybrid System in 9-Ray Urban Fast Fading with Two Independently Faded First Adjacent Interferers



With two analog first adjacent interferers whose power is 6 dB below the host FM power, margin between the TOA and the analog 54-dBu protected contour is about 3 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of two -6-dB first adjacent interferers.

This scenario, with two very large first adjacent interferers, is much worse than the typical situation. As the interference levels are reduced, system performance improves accordingly, as shown in Figure E-5. All interference scenarios yield significant margin between the TOA and the analog 54-dBu protected contour however, without the advantage of the receiver FAC algorithm, many of these scenarios would degrade system performance beyond the point of failure.

Performance in the presence of dual first adjacent hybrid interferers, or a combination of one hybrid and one analog first adjacent interferer, will be similar to performance with two first adjacent analog interferers, since the digital portion of the hybrid interferer does not overlap in frequency with the desired digital signal.

Performance in the presence of dual first adjacent all-digital interferers will be similar to performance in the absence of interference, since the all-digital interferers do not overlap in frequency with the desired digital signal.

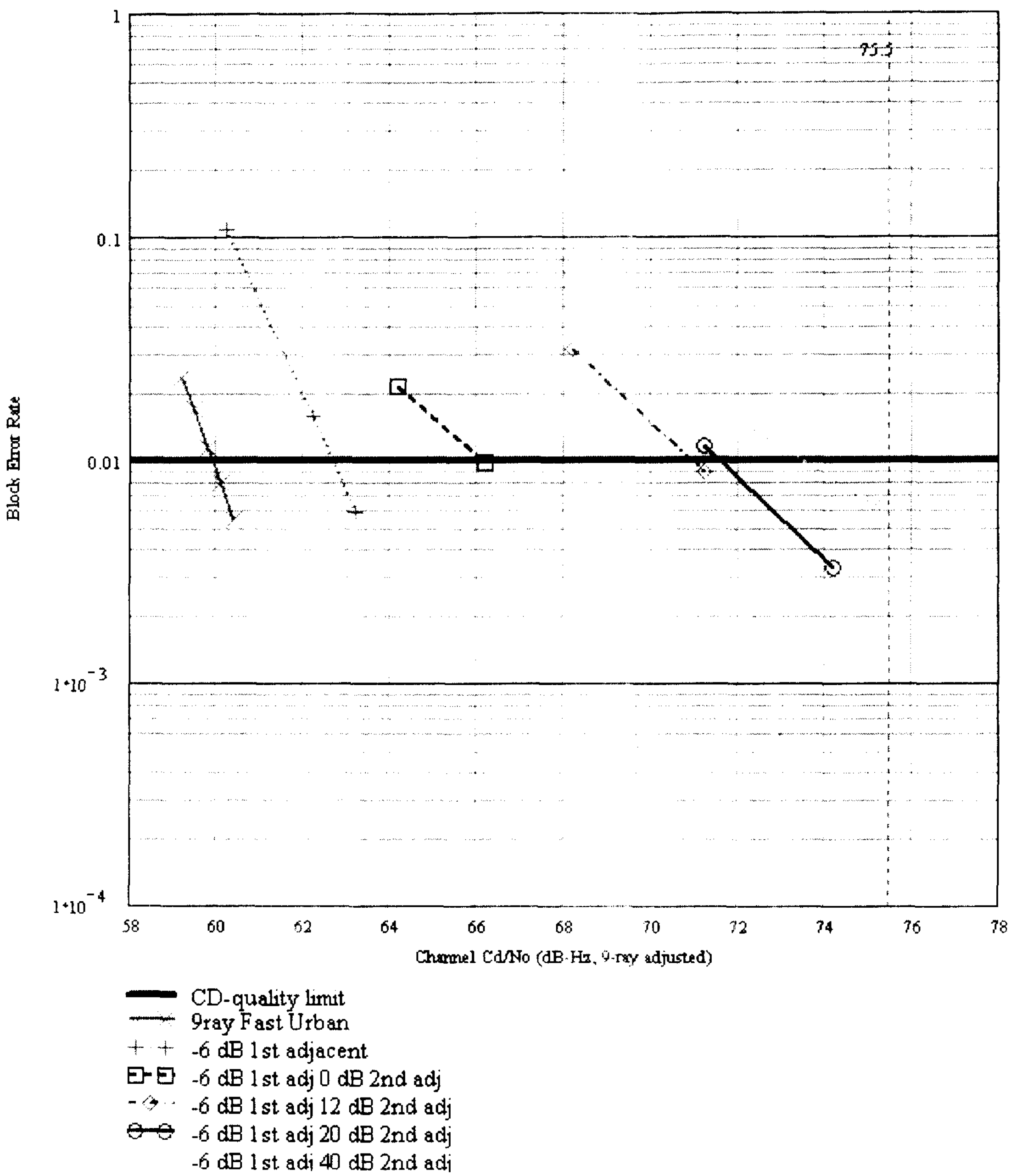
Performance in the presence of a combination of one all-digital and one hybrid first adjacent interferer will be similar to performance with a single first adjacent analog interferer, since neither the digital portion of the hybrid nor the all-digital interferer overlaps in frequency with the desired digital signal.

2.2.3.5 Simultaneous First and Second Adjacent Interference

Of particular interest is interference which consists of an analog first adjacent and a high-level digital second adjacent on the same sideband of the desired signal. Interaction of two such interferers in the receiver FAC algorithm could add noise to the desired digital signal. As a result, this interference scenario was simulated to quantify the degradation.

Figure E-6 and Table E-5 quantify the degradation as an upper second adjacent hybrid or all-digital interferer is increased in power in the presence of a -6-dB upper first adjacent analog or hybrid interferer. Note that all simulated interference scenarios yield significant margin between the TOA and the analog 54-dBu protected contour.

Figure E-6 Block Error Rate Results of the Hybrid System in 9-Ray Fast Urban Fading with an Independently Faded Lower First Adjacent Interferer and Lower Second Adjacent Interferer



The worst-case scenario, illustrated in Figure E-7, is comprised of an upper first adjacent analog or hybrid interferer whose analog power is 6 dB below the desired FM power, and an upper second adjacent hybrid or all-digital interferer whose digital power is 40 dB above the desired digital power. (This is highly unlikely, since these first and second adjacents are themselves first adjacents.) Margin between the TOA and the analog 54-dBu protected contour is about 2 dB in an urban fast-fading channel and a 10,000 K Gaussian noise environment in the presence of a -6-dB first adjacent analog or hybrid interferer and a +40-dB second adjacent hybrid or all-digital interferer. As the second adjacent interference levels are reduced, system performance improves accordingly, as shown in Figure E-6.

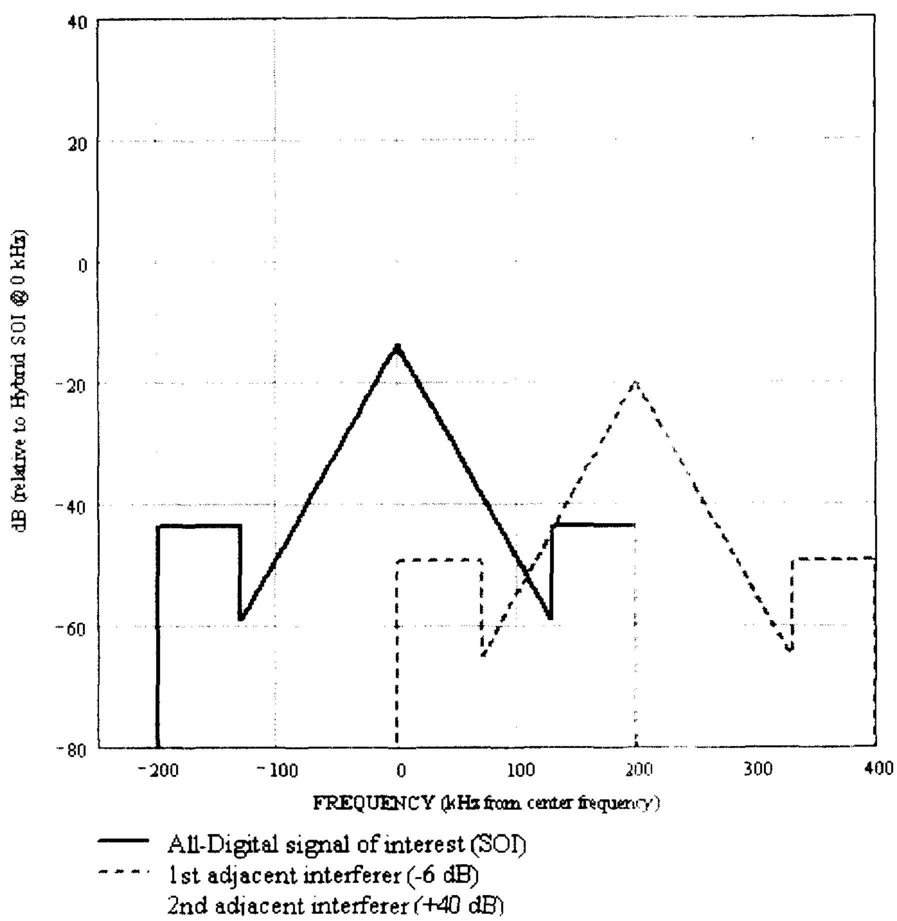


Figure E-7 - Simultaneous First and Second Adjacent Interference to Hybrid Signal of Interest

3.0 FM IBOC All-Digital System Performance

3.1 Definitions and Assumptions

The following analysis extrapolates the results from the hybrid system simulations to predict all-digital system performance. Accurate interpretation of the results is incumbent upon a thorough understanding of the assumptions and definitions described below.

3.1.1 Block error rate curves

Cd/No is defined as the carrier-to-noise-density ratio of the all-digital signal at the receiver input. Cd is a measure of the total power in the all-digital signal, while No is comprised of Gaussian noise (but not interfering signals) measured in a 1-Hz bandwidth. As was the case with the hybrid system, for the USADR all-digital IBOC system, the TOA is defined as 0.01, and is depicted on the block error rate curves as a bold horizontal line. The dashed vertical line on the block error rate curves identifies the Cd/No of the all-digital signal at the 54-dBu contour of an analog signal in a 10,000 K ambient noise environment, assuming an analog signal were present (as in the hybrid system).

The analog C/No at the 54-dBu contour is 97.5 dB-Hz. Since the total power in the two DAB sidebands is 22 dB below that of the analog FM in the hybrid system, and since the total power of the all-digital signal is around 11.5 dB higher than the total power in the hybrid DAB sidebands, the all-digital Cd/No at this point is 87.0 dB-Hz, as shown on the block error rate curves.

3.2 Results of Simulations and Analyses

Extrapolation of hybrid IBOC simulations and analyses have been used to predict the performance of the all-digital IBOC signal in the presence of Gaussian noise, multipath fading, and interference. Extrapolations assume that the additional all-digital carriers are not allocated to forward error correction.[19] Results while subject to various combinations of these impairments are presented and interpreted in the following sections, and are summarized in Table E-6.

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[19] If the carriers were allocated to FEC coding, it would further enhance the robustness relative to the hybrid signal and would be inconsistent with these extrapolations.

Table E-6: All-Digital IBOC Simulation Results

Tests	*Input Parameters*							*Measurements*	
Interference Scenarios	Cd/No (dB-Hz)	Fading	Co-Chan (dBfm)	Lower 1st Adj (dBfm)	Upper 1st Adj (dBfm)	Lower 2nd Adj (dBfm)	Upper 2nd Adj (dBfm)	Block Error Rate	Margin (dB)
No Fading/ No Interference	60.258							0.99431	
	60.658							0.71055	
	60.858							0.39033	
	61.058							0.15701	
	61.258							0.04785	
	61.458							0.0119	
	61.658							0.00181	32.50
9-Ray Fading	60.658	UF						0.0236186	
	60.958	UF						0.0171658	
	61.258	UF						0.0114021	
	61.558	UF						0.0078938	25.50
	62.658	US						0.105563	
	63.658	US						0.0813702	
	64.658	US						0.0573962	
	65.158	US						0.0438691	
	65.658	US						0.0337366	
	67.658	US						0.0128194	
	69.658	US						0.0043286	19.0
	55.596	FR						0.0451454	
	56.596	FR						0.0089486	
	57.596	FR						0.0019978	30.50
	57.036	TO						0.0709232	
	58.036	TO						0.0154832	
	59.036	TO						0.0029968	28.50
1st Adjacent Interferer	64.658	UF		12.0				0.25585	
	69.658	UF		12.0				0.01886	
	73.658	UF		12.0				0.0008771	16.50
	61.658	UF		-6.0				0.107428	
	63.658	UF		-6.0				0.01594	
	64.658	UF		-6.0				0.005889	23.0
	61.658	UF		-18.0				0.102607	
	63.658	UF		-18.0				0.01591	
	64.658	UF		-18.0				0.00474	23.0
	61.658	UF		-24.0				0.0635076	
	63.658	UF		-24.0				0.009397	
	64.658	UF		-24.0				0.00366	23.50
	60.658	UF		-30.0				0.0623907	
	62.658	UF		-30.0				0.0088654	24.50
Dual 1st Adjacent Interferers	68.658	UF		-6.0	-6.0			0.0545	
	72.658	UF		-6.0	-6.0			0.01575	13.0
	68.658	UF		-18.0	-18.0			0.01844	
	72.658	UF		-18.0	-18.0			0.00108	17.50
	68.658	UF		-24.0	-24.0			0.01557	
	72.658	UF		-24.0	-24.0			0.000603	17.750
	62.658	UF		-30.0	-30.0			0.03892	
	66.658	UF		-30.0	-30.0			0.00302	22.50
	64.658	UF		-6.0	-30.0			0.05296	
	68.658	UF		-6.0	-30.0			0.00844	19.0

Table E-6: All-Digital IBOC Simulation Results Continued									
Tests	*Input Parameters*							*Measurements*	
Interference Scenarios	Cd/No (dB-Hz)	Fading	Co-Chan (dBfm)	Lower 1st Adj (dBfm)	Upper 1st Adj (dBfm)	Lower 2nd Adj (dBfm)	Upper 2nd Adj (dBfm)	Block Error Rate	Margin (dB)
2nd Adjacent Interferer	61.658	UF				40.0		0.0204778	
	63.658	UF				40.0		0.0027887	24.50
	61.658	UF				30.0		0.0121951	
	63.658	UF				30.0		0.0011654	25.0
Dual 1st and 2nd Adjacent Interferers	72.658	UF		-6.0		40.0		0.0188546	
	76.658	UF		-6.0		40.0		0.0063681	12.0
	72.658	UF		-6.0		20.0		0.0116124	
	75.658	UF		-6.0		20.0		0.0032881	14.0
	69.658	UF		-6.0		12.0		0.0314594	
	72.658	UF		-6.0		12.0		0.0089486	15.0
	65.658	UF		-6.0		0.0		0.0215065	
	67.658	UF		-6.0		0.0		0.0098227	19.50
Co-Channel Interferer	61.658	UF	-20.0					0.0191294	
	62.658	UF	-20.0					0.006493	24.50
	61.658	UF	-30.0					0.0126946	
	63.658	UF	-30.0					0.0017897	25.0

For each simulation, Table E-6 lists the interference scenario under which it was run, the Cd/No in dB-Hz, the fading profile, the level of the interference, the measured block error rate, and the margin of the digital signal at the analog 54-dBu contour (assuming 10,000 K ambient noise). The fading profile is denoted by UF (urban fast), US (urban slow), RF (rural fast), or TO (terrain-obstructed fast), and is independently applied to the desired signal and each of the interferers. The interference level is given in units of dBfm, which is defined as dB relative to the total power of the analog host FM portion of a desired hybrid signal (if the desired signal were hybrid).

3.2.1 Gaussian Noise

The upper bound on system performance is indicated by its performance in Gaussian noise only, in the absence of Rayleigh fading and interference. The block error rate results are shown in Figure E-8, and summarized in Table E-6. The margin between the TOA and the analog 54-dBu protected contour is about 32.5 dB, assuming a 10,000 K Gaussian noise environment.